



Saskatchewan
Agriculture
and Food

FINAL REPORT

BEEF DEVELOPMENT FUND

20050759

**TECHNOLOGY TRANSFER ACTIVITIES OF THE
SASKATCHEWAN BEEF INDUSTRY CHAIR**

**Funded by
The Beef Development Fund**

**February 2011
Prepared by: University of Saskatchewan**



Saskatchewan Beef Industry Chair
2008-10 Program Review

J.J. McKinnon, Ph.D.
Department of Animal & Poultry Science



**UNIVERSITY OF
SASKATCHEWAN**

Extension, Research and Teaching Activities

2008 - 10

**John McKinnon, Ph. D.
Saskatchewan Beef Industry Chair**

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1. Extension Related Activities of the Saskatchewan Beef Industry Chair

Duties of the Chair as laid out by the Department Head (Form C - The Recommendation of the Department Head on Academic Appointments to the Vice President (Academia)) are to:

1. Conduct research and extension related to beef production and marketing systems affecting the market value of the animal and other areas as recommended by the Beef Chair Advisory Committee.
2. Develop a rapport with the beef industry and provide leadership for its future direction as well as promote communication among Animal Scientists, Food Scientists and Economists in universities, institutions and the beef industry concerning the production of animals of desirable characteristics to capitalize on market opportunities.

Review of Extension & Research Activity

The following is a list of extension and research related activities carried out by the Saskatchewan Beef Chair for the period July, 2008 through July 2010. This list includes a breakdown of meetings and publications. Below is a summary detailing the rationale for the work carried out.

Summary

The Beef Chair continues to focus a great deal of extension and research efforts on the cattle feeding (backgrounding & finishing) and cow/calf sectors, with research efforts extending to the packing and processing sectors. Much of this effort has been in co-operation with industry, university and government partners.

Examples include:

1. In conjunction with Drs. Phyllis Shand of the University of Saskatchewan and Jennifer Aalhus and Mike Dugan of Agriculture and Agri-Food Canada, the Beef Chair accessed Beef Science Cluster funding through the Canadian Cattleman's Association to study the impact of feeding distillers grain on beef quality and fatty acid composition.
2. In conjunction with Dr. Paul Jefferson of the WBDC and West Central Pelleting Ltd., Wilkie, Sk., the Beef Chair was successful in securing Agriculture Development Fund and Canadian Agriculture Adaptation Program funding to work on by-product feeds for the cattle feeding and cow-calf sectors.
3. The University of Saskatchewan has acted as the lead institution of a western Canadian network (Feed Opportunities in the BioFuels Industry) charged with researching and developing feed and value-added opportunities from the bio-fuels industries. This network involves 63 scientists from across western Canada and was

funded with a \$6 million grant from the Agricultural Bioproducts Innovation Program of Agriculture and Agri-Food Canada. The Beef Chair was one of two principle applications on this grant and currently serves as a member of the Network Expectative Committee.

4. The Beef Chair sits on an expert panel which helps to develop research directions for the beef research science cluster under the Growing Forward Program of Agriculture and Agri-Food Canada and the Beef Cattle Research Council of the Canadian Cattleman's Association.
5. The University of Saskatchewan in conjunction with the Saskatchewan Cattle Feeders Association and Saskatchewan Agriculture and Food held the 13th and 14th annual Western Canadian Feedlot Management Schools. As in previous years, the school was aimed at new feeders and cow-calf operators looking to diversify. Enrolment is limited to 40 to 45 people and continues to be filled at or near capacity. Objectives include development of feeding, economic and management skills of the participants. The school has been rated very highly by participants.
6. The Beef Chair is a member of the Advisory Committee for Western Beef Development Centre (Division of PAMI).
7. The Beef Chair in association with Saskatchewan Agriculture and Food, Agriculture and Agri-Food Canada and the Western Beef Development Centre planned and hosted the 2009 and 2010 Saskatchewan Beef and Forage Symposiums. This event is targeted at beef producers and industry and is a mechanism of transferring technology and research results to the beef industry. The meeting is also designed to focus on areas of the Saskatchewan beef industry that have opportunity for growth. In 2010 this event was held in conjunction with the Saskatchewan Beef Industry Conference.

8. The Beef Chair continues to work as a member of the Sustainable Beef Systems Research Group which looks at coordinating beef research activities across the Colleges of Agriculture, Engineering and WCVN. The Beef Chair is a member of the executive of this group. The intent of the group is to facilitate beef research on campus and to better communicate to the public the nature and extent of beef research conducted at the University of Saskatchewan.
9. In 2008 - 10, the Beef Chair continued to lead a committee formed to develop a business plan for relocation and construction of a new Beef Cattle Research and Teaching Unit. This committee consists of representatives from the College of Agriculture, Engineering and Veterinary Medicine as well as the Saskatchewan Cattle Feeders and the Ministry of Saskatchewan Agriculture.
10. In addition to the feedlot school, the Beef Chair places considerable extension efforts related to development of feedlot and management skills of individuals interested in backgrounding and finishing as well as cow-calf operators (examples are given in section 3).
11. Work continued with Terra Grains, Husky Oil, NorAmara Bioenergy and Pound-Maker Agventures Ltd. on the feeding value of distiller's grains for feedlot cattle.

Research and extension spin-offs from this activity involve close co-operation with Agriculture and Agri-Food Canada, Saskatchewan Agriculture and Food, the Western College of Veterinary Medicine, the Western Beef Development Centre and the Department of Animal and Poultry Science.

Examples include:

- Planning was initiated between Agriculture and Agri-Food Canada, WBDC, Saskatchewan Agriculture and Food and the University of Saskatchewan on the 2011 Saskatchewan Beef Symposium to be held in January of 2011.
- Work continues with the Western Beef Development Centre as a member of the Advisory Board and planning on cooperative research.
- Research on native grazing practices and environmental impacts was carried out with Dr. Alan Iwaasa with Agriculture and Agri-Food Canada at Swift Current, particularly in the joint recruiting and training of a graduate student who is working in the above area at the 2 facilities.
- Reducing backgrounding costs in Saskatchewan in conjunction with WDDC.
- Use of the Canadian Light Source to understand plant composition as it relates to nutrient utilization by cattle.
- Reducing backgrounding costs in Saskatchewan in conjunction with WDDC.
- Cooperative research with AAFC Lethbridge and Lacombe was carried out on distillers grain as it impacts performance, profitability and meat quality.

Beef Chair Extension Activities

1. Extension / Research Committee Membership

Member of the Organizing Committee 13th and 14th Western Canadian Feedlot Management School, July).

Member and Co-chair of the Organizing Committee 2009 and 2010 Saskatchewan Beef and Forage Symposium.

Member and Co-Chair, 2010 Western Nutrition Conference Planning Committee, 2009-10.

Member and Chair, Beef Cattle Research Unit Renewal Committee, 2008 to present.

Dept. of Animal and Poultry Science Undergraduate Programming & Awards, 2006 to present.

Dept. of Animal and Poultry Science Beef Committee, Chair, 2002 to present.

Member of Advisory Panel for Beef Science Cluster, Canadian Cattleman's Association.

Network Executive Committee Member, Feed Opportunities Biofuels Network, Agricultural Bioproducts Innovation Program.

Member of Expert Panel for Beef Science Cluster, Canadian Cattleman's Association.

Member of the 2009-2010 Western Beef Development Centre Advisory Committee.

2. Extension Activities & Meetings:

Putting Together Feedlot Diets. Presentation to Western Canadian Feedlot Management School, Saskatoon, SK., July, 2010.

Forage and Grain Processing Management. Presentation to Western Canadian Feedlot Management School, Saskatoon, SK., July, 2010.

Carcass Evaluation – What Do Graders Look for? Presentation to Western Canadian Feedlot Management School, Saskatoon, SK., July, 2010.

Western Nutrition Conference Planning Meeting, Saskatoon, SK. June, 2010.

Extension Visit to Big River, SK., March, 2010.

Feedlot School Planning Meeting, Melfort, SK., February, 2010.

Servicing Your Sire, Breeding for Profit – Bull Selection Workshop, Moose Jaw and Saskatoon, SK., February, 2010.

What's Under the Hide? Bull Selection Workshop, Moose Jaw and Saskatoon, SK., February, 2010.

Ethanol By-Products for Cattle. Saskatchewan Beef and Forage Symposium, Saskatoon, SK., January, 2010.

Western Beef Development Centre Advisory Committee Meeting, Regina, SK., November, 2009.

National Centre of Excellence – Excellence Canada, 2009 Program. FOBI Representative, Ottawa, November, 2009.

Storing Grain and Greenfeed, Fall Cattle Marketing and Feeding Seminar. Kenaston, Leader and Archerwell, SK., October, 2009.

Beef Cattle Industry Science Cluster Advisory Meeting, Canadian Cattleman's Association, Calgary, AB., October, 2009.

Western Nutrition Conference Planning Meetings, Saskatoon, SK., August, 2009.

Saskatchewan Stock Grower's Association Annual Meeting, Moose Jaw, SK. June, 2009.

Hosted Tour by Kansas State Animal Science Students of U of S and Western Beef Development Centre Research Facilities, May, 2009.

Saskatchewan Cattlemen's Association Annual Meeting, Saskatoon, SK. January, 2009.

Member and Co-Chair Organizing Committee, 2009 Saskatchewan Beef and Forage Symposium, Saskatoon, SK. January, 2009.

J.J. McKinnon, 2008. Managing Your Largest Expense - Feed. Elanco Feed Forum, Tisdale and Glaslyn, SK. October, 2008.

Forage Industry Stakeholder Forum Participant, Saskatchewan Forage Council, Saskatoon, SK. October, 2008.

J.J. McKinnon, 2008. Rangeland and Grazing Management Course. China-AAFC Program, Saskatoon, SK. September, 2008.

Member of the Organizing Committee, 2008. Western Canadian Feedlot Management School, Saskatoon, SK. July, 2008.

J.J. McKinnon - Live Animal Evaluation Lab; Carcass Evaluation - What do Graders Look For?; Processing Grain and Forage; and Putting Together Feedlot Diets. Presentations to the 2008 Western Canadian Feedlot Management School, Saskatoon, SK, July, 2008.

Extension Articles

Feeding Bulls Right - Canadian Cattleman's Magazine, February, 2010.

Special Considerations for Straw-Based Rations. Canadian Cattleman's Magazine, February, 2009.

Using Byproduct Feeds to Background Cattle, J.J. McKinnon and A. Walker, Canadian Cattlemen Magazine, Fall, 2008.

2. Examples of Extension Activities and Feedback

2008 - 10

3. Current Research Activities

A. New Projects

2009-10 New Grants/Contracts

J.J. McKinnon, D. Skinner and P. Jefferson, 2010-2012. Branded Feed Products for Cattle from By-products of Grain, Pulse and Oil Seed Processing. Saskatchewan Agriculture Development Fund. \$120,500 over 2 years.

D. Skinner, P. Jefferson and J.J. McKinnon, 2010-2012. Branded Feed Products for Cattle from By-Products of Grain, Pulse and Oil Seed Processing. Canadian Agricultural Adaptation Program. \$107,584 (CAAP) plus \$66,000 Industry Matching (WCP) over 2 years.

J.J. McKinnon, P.J. Shand, J. Aalhus and M. Duggan, 2009-2011. Composition and Meat Quality of Cattle Fed Wheat or Corn-Based Distillers Grains with Solubles From New Generation Ethanol Plants. Beef Cluster Within the Canadian Agri-Food Cluster Initiative (administered by the Beef Cattle Research Council). \$83,699 over two years. (\$57,076 to P.J. Shand in 2009-2010).

Ongoing Grants/Contracts

J.J. McKinnon, Renewal of the U of S Beef Cattle Research Unit. Cattle Marketing Deductions Fund, \$40,000, 2008-10.

J.J. McKinnon, M. Stumborg, S. Wright, C. Christensen and multiple co-applicants. Feed Opportunities From the Biofuels Industry. Agricultural Bioproducts Innovation Program. 2008-2011, \$6,000,000.

J.J. McKinnon, T. McAllister and K. Beauchemin. Evaluation of Wheat-Based Distiller's Grains From Ethanol Plants for Feedlot Cattle. Natural Sciences Engineering Research Council Collaborative Research and Development Grant, 2008-2010, \$148,250.

W. Yang, J.J. McKinnon, T.A. McAllister and D. Gibb. Evaluation of Distiller's Grains From Ethanol Plants for Feedlot Cattle, Beef Cattle Research Council and Alberta Beef Producers, 2008-2010, \$157,838.

F.C. Buchanan and J.J. McKinnon. Genetic Manipulation of Retinaldehyde Levels to Produce Leaner or Heavier Marbled Carcasses. AARI and ALIDF, 2008-2011, \$129,035.

B.L. Lardner and J.J. McKinnon. Reducing the Cost of Backgrounding Calves With Extended Fall Grazing of Animals. ADF, 2007-2010, \$99,000.

H.L. Classen and J.J. McKinnon. Technology Transfer Activities of the Saskatchewan Beef Industry Chair, Saskatchewan Beef Development Fund, 2006-2010, \$75,000.

H.L. Classen, J.J. McKinnon, B. Laarveld, K. Walburger, P. Yu, M. Nickerson and B. Lardner. Ethanol Production From Wheat – Value of Co-Products for Animal Production Saskatchewan Agriculture Development Fund, \$317,534, 2007-1010.

J. J. McKinnon and B. Laarveld. Optimizing the Use and Value of Distillers Dried Grains in Rations for Growing and Finishing Cattle. Advancing Canadian Agriculture and Agri-Food Saskatchewan, \$149,100, 2007-2010.

C. Projects Completed 2008-10

T. Mutsvangwa, J.J. McKinnon, V.J. Racz and D.A. Christensen. Amino Acid Utilization and Peripheral Tissue Metabolism in Ruminants Fed Full-Fat Canola-Based Diets. Natural Sciences and Engineering Research Council of Canada, Canada Council of Canada, Saskatchewan Canola Development Commission, 2005-2008, \$312,988.

J.J. McKinnon, P. Yu, D. Christensen and C. Christensen. Use of the Canadian Light Source to Improve Saskatchewan Feeds and Cattle Production, Agriculture Development Fund, \$235,000. 2005-2009.

J.J. McKinnon. Nutritional Evaluation of Livestock Feeds, \$125,000. NSERC, 2004-2009.

4. Publication Record:

A. PAPERS IN REFEREED JOURNALS:

ACCEPTED:

H.E. Yang, W.Z. Yang, **J.J. McKinnon**, T.W. Alexander, Y. Li and T.A. McAllister, 2010. Survival of *E. coli* 0157:H7 in Ruminal or Fecal Contents Incubated with Corn or Wheat Dried Distillers Grains with Solubles. Canadian Journal of Microbiology (Accepted).

PUBLISHED:

L.J. Walter, J.L. Aalhus, W.M. Robertson, T.A. McAllister, D.J. Gibb, M.E.R. Dugan, N. Aldai and **J.J. McKinnon**, 2010. Comparison of Wheat or Corn Dried Distillers Grains With Solubles on Performance and Carcass Characteristics of Feedlot Steers. Canadian Journal of Animal Science. **90**: 259-269.

N. Aldai, M.E.R. Dugan, J.L. Aalhus, T.A. McAllister, L.J. Walter and **J.J. McKinnon**, 2010. Difference in the Trans-18:1 Profile of the Backfat of Feedlot Steers Fed Wheat or Corn Based Dried Distillers Grains. Animal Feed Science and Technology, **157**: 168-172.

N. Aldai, J.L. Aalhus, M.E.R. Dugan, W.M. Robertson, T.A. McAllister, L.J. Walter and **J.J. McKinnon**, 2010. Comparison of Wheat- Versus Corn-Based Dried Distillers' Grains with Soluble on Meat Quality of Feedlot Cattle. Meat Science. **84**: 569-577.

H.C. Block, J.L. Bourne, H.A. Lardner and **J.J. McKinnon**, 2010. Evaluation of NRC (2000) Model Energy Requirements and DMI Equations Accuracy and Precision for wintering Cows in Western Canada. Canadian Journal of Animal Science, **90**: 245-258.

A. Jonker, M.Y. Gruber, M. McCaslin, Y. Wang, B. Coulman, **J.J. McKinnon**, D.A. Christensen and P. Yu, 2010. Nutrient Composition and Degradation Profiles of Anthocyanidin-Accumulating Lc-Alfalfa Populations. Canadian Journal of Animal Science, **90**(3): 401-412.

R.G. Heendeniya, D.A. Christensen, D.D. Maenz, **J.J. McKinnon** and P. Yu, 2010. Utilization of Canola Seed Fractions for Ruminants: Effect of Canola Fibre-Protein and Can-Sugar Inclusion in Dehydrated Alfalfa Pellets on Palatability and Lactation Performance of Dairy Cows. Canadian Journal of Animal Science, **90**(2): 279-283.

K.J. Doiron, P. Yu, C.R. Christensen, D.A. Christensen, **J.J. McKinnon**, 2009. Detecting Molecular Changes to Vimy Flaxseed Protein Structure Using Synchrotron FTIRM and DRIFT Spectroscopic Techniques: Structural and Biochemical Characterization. Spectroscopy - An International Journal (UK, Editor), **23** (5-6): 307-322.

R. Beliveau and **J.J. McKinnon**, 2009. Effect of Graded Levels of Wheat-based Dried Distillers Grains with Solubles on Rumen Fermentation in Finishing Cattle. Canadian Journal of Animal Science, **89**: 513-520.

L. Du, P. Yu, B.G. Rossnagel, D.A. Christensen and **J.J. McKinnon**, 2009. Physicochemical Characteristics, Hydroxycinnamic Acids (Ferulic Acid, p-Coumaric Acid) and Their Ratio and In Situ Biodegradability: Comparison of Genotypic Differences Among Six Barley Varieties. Journal of Agriculture, Food & Chemistry, **57** (11): 4777-83.

K. Doiron, P. Yu, **J.J. McKinnon** and D.A. Christensen, 2009. Heat-Induced Protein Structure and Subfractions in Relation to Protein Degradation Kinetics and Intestinal Availability in Dairy Cattle. Journal of Dairy Science, **92**: 3319-3330.

J.J. McKinnon and A. Walker, 2009. Comparisons of Canola and Mustard Presscake from Biodiesel Production as Protein Sources for Growing Cattle. Canadian Journal of Animal Science, **89**: 401-408.

G.N. Gozho, **J.J. McKinnon**, D.A. Christensen, V. Racz and T. Mutsvangwa, 2009. Effects of Type of Canola Protein Supplement on Ruminal Fermentation and Nutrient Flow to the Duodenum in Beef Heifers. Journal of Animal Science, **87**: 3363-3371.

A.M. Walker, P. Yu, C.R. Christensen, D.A. Christensen and **J.J. McKinnon**, 2009. Fourier Transform Infrared Microspectroscopic Analysis of the Effects of Cereal Type and Variety Within a Type of Grain on Structural Make-Up in Relation to Rumen Degradation Kinetics. Journal of Agriculture, Food & Chemistry, **57**: 6871-6878.

L.M. Williams, H.C. Block, D.A. Christensen, V. Racz, K. Ataku, B. Wildeman and **J.J. McKinnon**, 2008. Effect of Feeding a Processed Barley/Canola Meal Pellet on Performance and Carcass Quality of Feedlot Steers. Canadian Journal of Animal Science, **88**: 667-676.

B. TECHNICAL REPORTS:

J.J. McKinnon, A. Walker, K. Dorian, D. Damiran, P. Yu, D.A. Christensen and C.R. Christensen, 2010. Use of Canadian Light Source (National Synchrotron Facility) to Understand and Improve the Nutritive Value of Plant Materials for Livestock. Final Report to Saskatchewan Agriculture Development Fund.

J. McKinnon and S. Arya, 2008. Optimizing the Opportunities for Specialty Oat Varieties in Feedlot Rations. Final Report to the Saskatchewan Agriculture Development Fund. Project #20050727. September.

C. Conference Presentations:

L.C. Stoll*, P.J. Shand and **J.J. McKinnon**, 2010. A Comparison of Wheat, Corn and Blend-Based Distillers Grains Plus Solubles on the Quality of Beef *Longissimus*. 63rd Reciprocal Meat Conference of the American Meat Science Association, Lubbock, Texas, June 20-23 [poster LCS and PJS] Abstract – Meat Science 86:552. *M.Sc. Student.

B. Liu, **J.J. McKinnon**, P.A. Thacker and P. Yu, 2010. Molecular Spectral Features and Protein Metabolic Characteristics of New Co-Products of BioEthanol Production. The 13th Canadian Light Source (CLS) Annual Users' Meeting and Associated Workshops, Saskatoon, Canada, June 17-18.

D. Damiran, P. Yu, A. Fodje, **J.J. McKinnon** and D.A. Christensen, 2010. Use of Synchrotron-Based Fourier Transform Infrared (FTIR) Microspectroscopy to Determine the Relative Quantity of Aromatic Lignin and Cellulosic Compounds of the Wheat Plant Stem. In: Life Sciences Section, Canadian Light Source (CLS: Synchrotron) Activity Report 2009, Editor, M. Dalzell, pp. 62-63.

N. Liu, **J.J. McKinnon**, D.A. Christensen and P. Yu, 2010. Characterize Microchemical Structure of Seed Endosperm Within a Cellular Dimension Among Six Barley Varieties, Using Ultraspatially Resolved Synchrotron-Based Infrared Microspectroscopy. In: Life Sciences Section, Canadian Light Source (CLS: Synchrotron) Activity Report 2009, Editor, M. Dalzell, pp. 64-65.

L.J. Walter, J.L. Aalhus, W.M. Robertson, T.A. McAllister and **J.J. McKinnon**, 2009. Comparison of Wheat or Corn Dried Distillers' Grains with Solubles (DDGS) on Performance and Carcass Characteristics of Feedlot Steers. Joint Annual Meeting of the ASAS, CSAS, ADSA, Montreal, Quebec, July.

G.R. Zalinko, B.G. Rossnagel, V.J. Racz, D.A. Christensen and **J.J. McKinnon**, 2009. Performance of Steers Fed a High Energy Oat as a Replacement for Barley Grain or Corn in Growing and Finishing Diets. Joint Annual Meeting of the ASAS, CSAS, ADSA, Montreal, Quebec, July.

D. PROFESSIONAL PRACTICE:

2009-10:

Reviewer for Animal Production and Canadian Journal of Animal Science.

Member of Advisory Panel for Beef Science Cluster, Canadian Cattleman's Association.

Network Executive Committee Member, Feed Opportunities Biofuels Network, Agricultural Bioproducts Innovation Program.

2008-09:

Reviewer for Animal Production and Canadian Journal of Animal Science.

External Reviewer for AAFC-Brandon Research Centre Animal Care Committee (Protocol 19, 20/21).

External Reviewer for Beef Cattle Production Certificate Program, Saskatchewan Institute Applied Science Technology.

External Reviewer Alberta Livestock Industry Development Fund (Project 2009 F089R).

Member of Expert Panel for Development of a Business Plan for new Beef Science Cluster, Canadian Cattleman's Association.

Member of the 2008-2009 Western Beef Development Centre Advisory Committee.

Member Network Executive Committee, Feed Opportunities Biofuels Network, Agricultural Bioproducts Innovation Program.

5. TEACHING RECORD:

1. Graduate Students: Supervised and Committee Member:

Graduated:

2009-10:

L.J. Walter, M.Sc. Comparison of Wheat or Corn Dried Distillers Grains with Soluble on Performance, Carcass Characteristics, Rumen Fermentation Parameters and Diet Digestibility of Feedlot Cattle, 2010.

S. Arya, M.Sc. Value of a Low Lignin Hull High-Oil Groat Oat for Feedlot Cattle, 2009.

J. Kusler, M.sc. Comparing Simple and Complex Native Forage Mixtures for Grazing Cattle for South-Western Saskatchewan, 2009.

2008-09:

R. Beliveau, M.Sc. Effect of Graded Levels of Wheat-Based Distiller's Grains in a Barley Ration on Growth Performance, Carcass Quality and Rumen Characteristics of Feedlot Steers, 2008.

Graduate Students Supervised:

2009-10 Supervised

| | | |
|----------------------------|-------|--|
| S. Saimaiti | M.Sc. | Cattle Nutrition/Health (Co-supervised S. Hendricks) |
| L. Walter | M.Sc. | Feedlot Nutrition |
| G. Zalinko | M.Sc. | Feedlot Nutrition |
| R. Beliveau McAllister) | Ph.D. | Feedlot Nutrition (Co-supervised with T. |
| K. Baker Mutsvangwa) | Ph.D. | Cattle Nutrition (Co-supervised with T. |
| S. Arya | M.Sc. | Feedlot Nutrition |
| J. Kusler Iwaasa) | M.Sc. | Pasture Management (Co-supervised with A. |
| R. Kumar Lardner) | M.Sc. | Ruminant Nutrition (Co-supervised with B. |

2009-10 Committee:

| | | |
|---------------------|-------|-----------------------------|
| A. Boaitay | M.Sc. | Ag. Economics |
| B. Liu | M.Sc. | Ruminant Nutrition |
| A. Krause | M.Sc. | Beef Nutrition |
| L. Clark | M.Sc. | Beef Nutrition |
| A. Jonker | Ph.D. | Ruminant Nutrition |
| L. Girardin | M.Sc. | Cow/Calf Management |
| W. Nuez-Ortin | M.Sc. | Ruminant Nutrition |
| A. Van de Kerckhove | M.Sc. | Cow/Calf Management |
| K. McLean | Ph.D. | Beef Genetics |
| C. Ward | M.Sc. | Pasture/Beef Management |
| K. Doiron | M.Sc. | Synchrotron/Plant Structure |
| K. Doranalli | Ph.D. | Ruminant Nutrition |
| N. Lui | M.Sc. | Ruminant Nutrition |
| L. Du | M.Sc. | Ruminant Nutrition |
| A. Ward | | Ph.D. Genetics/Nutrition |
| G. Chibisa | Ph.D. | Dairy Nutrition |
| R. Kumar | M.Sc. | Ruminant Nutrition |

2008-09 Supervised

| | | |
|-------------|-------|--|
| L. Walter | M.Sc. | Feedlot Nutrition |
| G. Zalinko | M.Sc. | Feedlot Nutrition |
| R. Beliveau | M.Sc. | Feedlot Nutrition |
| K. Baker | Ph.D. | Cattle Nutrition (Co-supervised with Tim Mutsvangwa) |
| S. Arya | M.Sc. | Feedlot Nutrition |
| J. Kusler | M.Sc. | Pasture Management (co-supervised with A. Iwaasa) |
| Iwaasa) | | |
| G. Gozho | PDF | Ruminant Nutrition (Joint with T. Mutsvangwa) |

2008-09 Committee:

| | | |
|---------------------|-------|-----------------------------|
| A. Jonker | Ph.D. | Ruminant Nutrition |
| L. Girardin | M.Sc. | Cow/Calf Management |
| W. Nuez-Ortin | M.Sc. | Ruminant Nutrition |
| A. Van de Kerckhove | M.Sc. | Cow/Calf Management |
| K. McLean | Ph.D. | Beef Genetics |
| C. Ward | M.Sc. | Pasture/Beef Management |
| B. Kelln | M.Sc. | Cow-Calf Management |
| M. Hobin | M.Sc. | Dairy Nutrition |
| R. Heendeniya | M.Sc. | Cattle Nutrition |
| K. Doiron | M.Sc. | Synchrotron/Plant Structure |
| K. Doranalli | Ph.D. | Ruminant Nutrition |
| D. DeLury | M.Sc. | Sociology |

| | | |
|------------|-------|-------------------------|
| S. Collins | M.Sc. | Fish Nutrition |
| N. Lui | M.Sc. | Ruminant Nutrition |
| L. Du | M.Sc. | Ruminant Nutrition |
| A. Ward | | Ph.D.Genetics/Nutrition |
| G. Chibisa | Ph.D. | Dairy Nutrition |
| R. Kumar | M.Sc. | Ruminant Nutrition |

2.0 Undergraduate Thesis supervised

3 students 2009/10

4 students 2008/09

3.0 Scheduled Instructional Activity:

2009-10

| | | | | |
|--------------------------------------|-----|----|----|-----|
| ANSC 430 Intensive Feedlot Prod. | Lec | 25 | 29 | 725 |
| ANSC 430 Intensive Feedlot Prod. | Lab | 25 | 24 | 600 |
| Agric 492 Tech. Writing (Supervisor) | Res | 3 | 15 | 45 |
| VLAC 449 Beef Industry Elective | Lec | 25 | 3 | 75 |

2008-09

| | | | | |
|--------------------------------------|------|----|------|------|
| ANSC 301 Animal Production Tour | Tour | 17 | 33 | 561 |
| ANSC 301 Animal Production Tour | Lab | 17 | 26 | 442 |
| ANSC 430 Intensive Feedlot Prod. | Lec | 48 | 31 | 1488 |
| ANSC 430 Intensive Feedlot Prod. | Lab | 48 | 13.5 | 648 |
| Agric 492 Tech. Writing (Supervisor) | Res | 4 | 15 | 60 |
| ANSC 815 Advanced Ruminant Nutrition | Lec | 6 | 34.5 | 207 |



